

## MARIE

### March 2003 Status – Science Data Comments

The MARIE instrument is continuing to perform as expected and providing science data as anticipated.

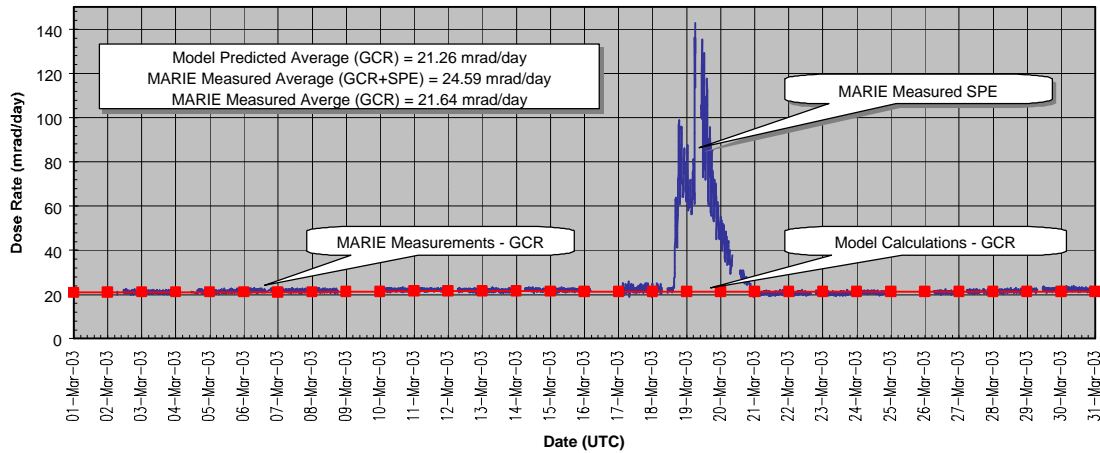
During March 2003, the MARIE instrument provided radiation data from 1<sup>st</sup> through the 31<sup>st</sup> with five intermittent breaks during 1<sup>st</sup> to 2<sup>nd</sup>, 4<sup>th</sup> to 5<sup>th</sup>, 9<sup>th</sup> to 10<sup>th</sup>, 16<sup>th</sup> to 17<sup>th</sup>, and 25<sup>th</sup> to 26<sup>th</sup> due to data down load and erase sequence. In the month of March, the MARIE instrument collected data for a total of ~ 26 days.

Radiation dose-rate measurements from MARIE data during the period from March 1<sup>st</sup> through 31<sup>st</sup> indicate that the background GCR dose-rate was  $21 \pm 2$  mrad/day, within 5% of model calculations. For the month of March, the predicted model estimate of *quiet-time* GCR was 21.26 mrad/day while the MARIE measured March monthly average being 21.64 mrad/day. Thus, the MARIE measurements are within 2% of the predicted model calculations. The data from the month of March consists of the *quiet-time* GCR and an SPE during March 18<sup>th</sup>. The average Earth-Sun-Mars angle during March was about 62.92° with Earth at 0.99 AU and Mars at 1.53 AU

MARIE Events to Remember: The month of **June** was reported to be the first month without any SPE enhanced dose rate. The month of **July** showed the highest SPE enhanced dose-rate for the first time at Mars orbit during the current solar cycle since March-2002. At its peak, the dose-rate was observed to exceed 1000 mrad/day. In the month of **August**, the instrument was kept in *standby* mode for 20 days for the first time during the mapping phase since March 2002. In the month of **October**, MARIE observed two prominent SPE enhanced dose-rate events. This is a first observation for the MARIE instrument to obtain SPE enhanced dose-rates from two different strong events (~ 500 mrad/day around October 15<sup>th</sup> and > 1000 mrad/day around October 28<sup>th</sup>) in one month. These events were originated from the *farside* of the Sun (on the solar disk that is facing away from the Earth) and were not seen by near-Earth monitors such as GOES-8. **December-February** is the first time with no SPE enhanced activity for complete three months consecutively during the mapping phase. **March-2003** is the first month during 2003 with an SPE.

Further analysis of the science data is in progress.

March 2003: MARIE Measurements and Model Calculations  
(As of 04/18/03: PS/FC)



**Figure-1:** Radiation dose-rate from the GCR contribution in the Martian orbit during March 2003. Dose-rate (mrads/day) measurements from the MARIE instrument (blue discrete line) are shown along with the HZETRN model predictions (red dotted line). Measured dose-rate is within 5% of the model predictions. Also, see Figure-3.

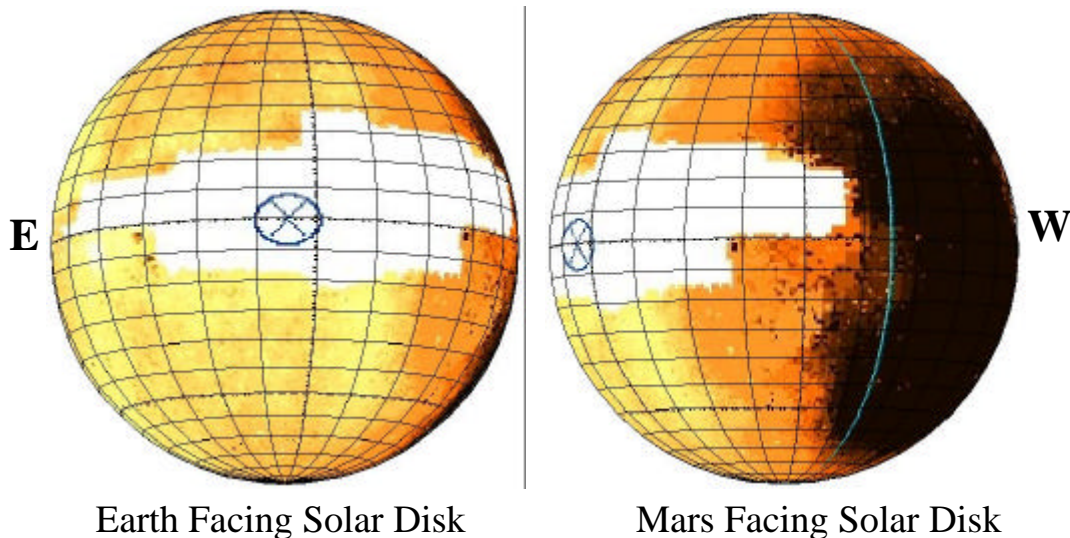
## Solar Disks (3D views)

March 15, 2003: Earth-Sun-Mars @ 63.35°

*Shown with Solar Beta*

$\beta = -7.16$

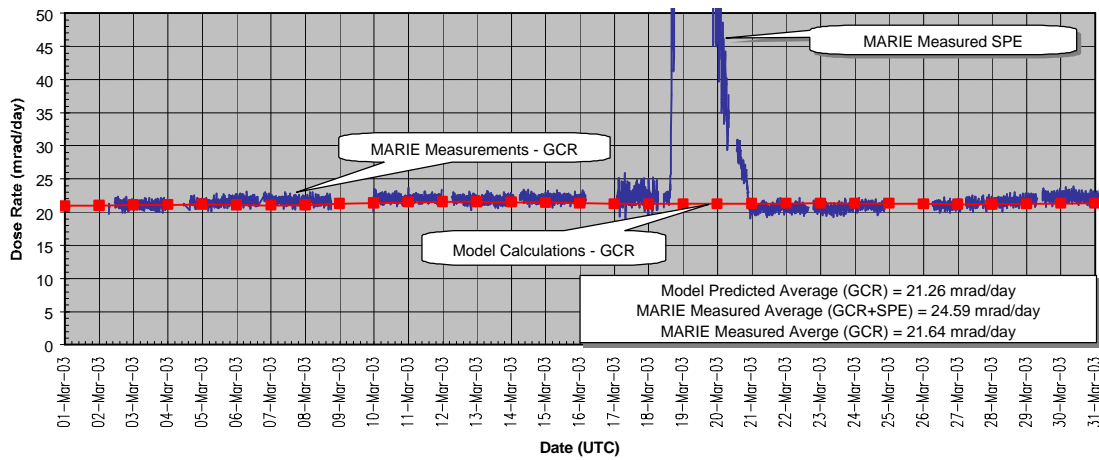
$\beta = -2.54$



*Note: data from SOHO and the visualization from SRHP*

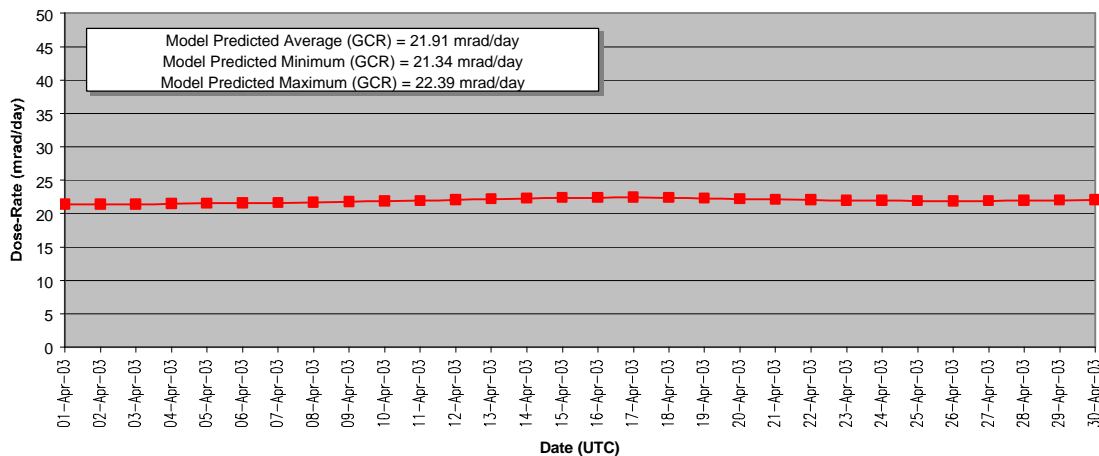
**Figure-2:** Solar disks on March 15, 2003. Both the Earth facing (on the left) and the Mars facing (on the right) are shown in 3D.

**March 2003: MARIE Measurements and Model Calculations**  
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**Figure-3** (Close-up view of Figure-1): Radiation dose-rate from the GCR contribution in the Martian orbit during March 2003. Dose-rate (mrad/day) measurements from the MARIE instrument (blue discrete line) are shown along with the HZETRN model predictions (red dotted line). Measured dose-rate is within 5% of the model predictions.

**April 2003: Model Predictions for MARIE**  
(As of 04/18/03: PS/FC)



**Figure-4:** Model predicted dose-rate for April-2003 is presented and the average dose-rate from the quiet-time GCR contribution is expected ~ 22 mrad/day.